

We claim:

- 1 1. A method for generating a two-dimensional distance field within a cell  
2 associated with a two-dimensional object, comprising:  
3       determining a set of boundary descriptors for the two-dimensional object;  
4       partitioning the set of boundary descriptors into a set of segments, the  
5 segments delimited by a set of features of the set of boundary descriptors;  
6       identifying a first segment and a second segment in the set of segments  
7 associated with the cell;  
8       specifying a first set of distance values using the first segment;  
9       specifying a second set of distance values using the second segment;  
10       defining a reconstruction method for reconstructing the distance field within  
11 the cell using the first set of distance values and the second set of distance values;  
12 and  
13       storing for the cell, the first set of distance values, the second set of distance  
14 values, and the reconstruction method in a memory to enable reconstruction of the  
15 distance field within the cell by applying the reconstruction method.
- 1 2. The method of claim 1 wherein a particular boundary descriptor in the set of  
2 boundary descriptors is a spline curve.
- 1 3. The method of claim 1 wherein a particular boundary descriptor in the set of  
2 boundary descriptors is a line segment.

1 4. The method of claim 1 wherein a particular feature in the set of features is a  
2 point of a corner associated with the set of boundary descriptors.

1 5. The method of claim 1 wherein a particular feature in the set of features is a  
2 point associated with a substantial degree of curvature of the set of boundary  
3 descriptors.

1 6. The method of claim 1 wherein a particular feature in the set of features is an  
2 endpoint associated with the set of boundary descriptors.

1 7. The method of claim 1 wherein a particular feature in the set of features is a  
2 point associated with a substantial amount of accumulated curvature of the set of  
3 boundary descriptors.

1 8. The method of claim 1 wherein the partitioning uses an analytic description of  
2 the set of boundary descriptors to determine a particular feature in the set of  
3 features.

1 9. The method of claim 1 wherein the identifying further comprises:  
2 selecting the first segment from the set of segments according to a distance  
3 of the first segment from the cell; and  
4 selecting the second segment from the set of segments according to a  
5 distance of the second segment from the cell.

1 10. The method of claim 1 wherein the reconstruction method determines a sample  
2 distance at a sample point associated with the cell, the determining comprising:  
3 determining a first distance from the first set of distance values;  
4 determining a second distance from the second set of distance values; and  
5 combining the first distance and the second distance to reconstruct the  
6 sample distance.

1 11. The method of claim 10 wherein the combining selects a minimum of the first  
2 distance and the second distance.

1 12. A method for generating a distance field for a region of a shape descriptor  
2 representing an object, the distance field including a set of cells, comprising:  
3 defining a set of cell types;  
4 generating a configuration of a set of cells for the region, each cell having a  
5 particular cell type as defined by the set of cell types and a method for  
6 reconstructing the distance field within the cell;  
7 modifying the configuration of the set of cells based on the shape descriptor,  
8 the region, and the set of cell types until an optimal configuration of the set of cells  
9 for the region is reached; and  
10 storing the optimal configuration of the set of cells in a memory to generate  
11 the distance field for the region of the shape descriptor representing the object.

1 13. The method of claim 12 wherein a particular cell type in the set of cell types is  
2 a bi-linear cell type.

1 14. The method of claim 12 wherein a particular cell type in the set of cell types is  
2 a bi-quadratic cell type.

1 15. The method of claim 12 wherein a particular cell type in the set of cell types is  
2 a two-segment cell type.

1 16. The method of claim 12 wherein a particular cell type in the set of cell types is  
2 a corner cell type.

1 17. The method of claim 12 wherein the configuration of the set of cells tessellates  
2 the region.

1 18. The method of claim 12 wherein the configuration of the set of cells covers a  
2 subset of the region.

1 19. The method of claim 12 wherein the configuration of the set of cells covers a  
2 superset of the region.

1 20. The method of claim 12 wherein the cells in the configuration of the set of cells  
2 are overlapping.

1 21. The method of claim 12 wherein the generating of the configuration of the set  
2 of cells is manual.

1 22. The method of claim 12 wherein the generating of the configuration of the set  
2 of cells is automatic.

1 23. The method of claim 12 wherein the generating of the configuration of the set  
2 of cells is semi-automatic.

1 24. The method of claim 12 wherein the modifying of the configuration of the set  
2 of cells is manual.

1 25. The method of claim 12 wherein the modifying of the configuration of the set  
2 of cells is automatic.

1 26. The method of claim 12 wherein the modifying of the configuration of the set  
2 of cells is semi-automatic.

1 27. The method of claim 12 wherein the optimal configuration of the set of cells  
2 minimizes a size of the distance field.

1 28. The method of claim 12 wherein the optimal configuration of the set of cells  
2 minimizes a time required to render the distance field.

1 29. The method of claim 12 wherein the optimal configuration of the set of cells  
2 minimizes a time required to generate the distance field.

1 30. The method of claim 12 wherein the optimal configuration of the set of cells  
2 maximizes a quality metric of a rendering of the distance field.

1 31. The method of claim 12 wherein the modifying terminates when a time  
2 threshold is exceeded.

1 32. The method of claim 12 wherein the modifying terminates when an iteration  
2 count threshold is exceeded.

1 33. The method of claim 12 wherein the modifying further comprises:

2 adding at least one cell to the configuration of the set of cells.

1 34. The method of claim 12 wherein the modifying further comprises:

2 removing at least one cell from the configuration of the set of cells.

1 35. The method of claim 12 wherein the modifying further comprises:

2 changing an attribute of a particular cell in the configuration of the set of  
3 cells.

1 36. The method of claim 35 wherein the attribute is a geometry of the particular

2 cell.

1 37. The method of claim 35 wherein the attribute is a location of the particular cell.

1 38. The method of claim 35 wherein the attribute is an orientation of the particular

2 cell.

1 39. The method of claim 35 wherein the attribute is a particular cell type of the set

2 of cell types for the particular cell.

1 40. The method of claim 12 wherein the generating further comprises:

2 preprocessing the shape descriptor to determine a preprocessed shape

3 descriptor and a preprocessed distance procedure for the region; and

4 accelerating the generation of the configuration of the set of cells using the

5 preprocessed shape descriptor and the preprocessed distance procedure.

1 41. The method of claim 40 wherein the modifying further comprises:  
2 accelerating the modifying of the configuration of the set of cells using the  
3 preprocessed shape descriptor and the preprocessed distance procedure.

1 42. The method of claim 12 wherein the generating further comprises:  
2 determining a set of features associated with the shape descriptor; and  
3 generating the configuration of the set of cells using the set of features.

1 43. The method of claim 42 wherein the modifying further comprises:  
2 modifying the configuration of the set of cells using the set of features.

1 44. The method of claim 43 wherein the modifying further comprises:  
2 adding an additional feature to the set of features.

1 45. The method of claim 43 wherein the modifying further comprises:  
2 removing a particular feature from the set of features.

1 46. The method of claim 43 wherein the modifying further comprises:  
2 altering a particular feature in the set of features.

1 47. The method of claim 42 wherein a particular feature in the set of features is a  
2 point of a corner associated with the shape descriptor.

1 48. The method of claim 42 wherein a particular feature in the set of features is a  
2 point associated with a substantial degree of curvature of the shape descriptor.

1 49. The method of claim 42 wherein a particular feature in the set of features is an  
2 endpoint associated with the shape descriptor.

1 50. The method of claim 42 wherein a particular feature in the set of features is a  
2 point associated with a substantial amount of accumulated curvature of the shape  
3 descriptor.

1 51. The method of claim 12 wherein the generating further comprises:  
2 defining an arbitrary initial set of cells to generate the configuration of the  
3 set of cells.

1 52. The method of claim 12 wherein the generating uses a randomized method.

1 53. The method of claim 12 wherein the generating uses a probabilistic method.

1 54. The method of claim 12 wherein the modifying uses a randomized method.

1 55. The method of claim 12 wherein the modifying uses a probabilistic method.

1 56. The method of claim 15 wherein a particular cell in the configuration of the set  
2 of cells having the two-segment cell type comprises a first set of distance values  
3 corresponding to a first segment, a second set of distance values corresponding to a  
4 second segment, and a reconstruction method for reconstructing the distance field  
5 within the particular cell using the first set of distance values and the second set of  
6 distance values, further comprising;

7 partitioning the shape descriptor into a set of segments, the segments  
8 delimited by a set of features of the shape descriptor; and



- 9 identifying the first segment and the second segment from the set of
- 10 segments associated with the particular cell.